

# ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

## FY14 Project Description

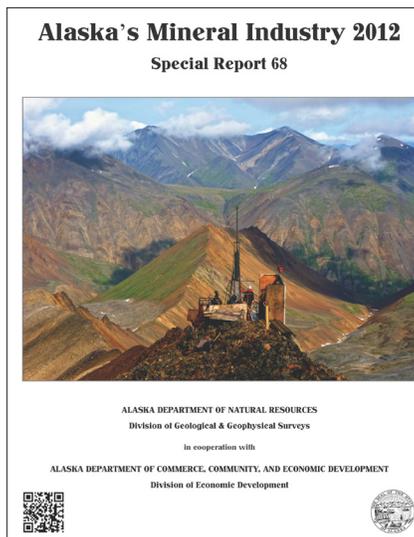
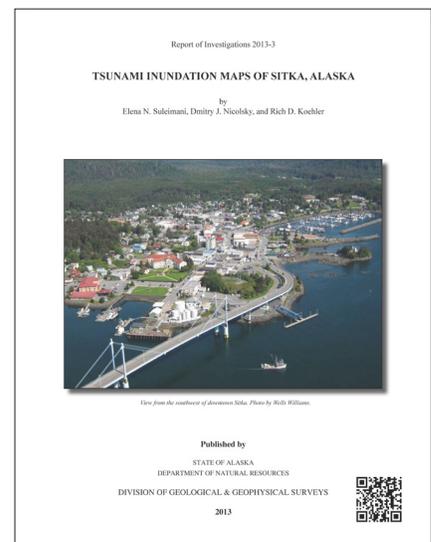
### PUBLICATIONS AND OUTREACH PROJECT

This project publishes and distributes geologic data that has been collected, analyzed, and assembled by DGGs geologists. Some of the functions carried out through this project are:

- Design, digitally assemble, edit, and coordinate production of technical and educational geologic maps, reports, and informational publications in printed and digital formats.
- Prepare an annual report describing DGGs projects, activities, and accomplishments, and relating future challenges.
- Publish newsletters to summarize Division field projects and achievements and announce new publications.
- Prepare displays and represent the division at geologic conferences and meetings by providing staff and designing, assembling, and transporting the display booth.
- Staff full-time geologic information center; providing data about Alaska's geologic resources and hazards through Division publications, geoscience specialists, and other resources. Sell and distribute printed and online geologic reports, maps, and digital data.
- Manage DGGs's reference library so that reports, maps, and other data are available and publications that geologists need to prepare geologic products are readily accessible.
- Maintain as complete a collection as possible of Alaska-related geoscience publications produced by the U.S. Geological Survey, the former U.S. Bureau of Mines, the U.S. Bureau of Land Management, and the UAF Mineral Industry Research Laboratory; and other Alaska-related publications as needed.



Publications produced by this group record and preserve geologic data such as: statistics for Alaska's mineral industry; detailed (1:63,360-scale or greater) bedrock, surficial, and engineering-geologic maps for specific areas in the state; sources of Alaska's geologic information; annual information about DGGs's programs and accomplishments; airborne geophysical data for areas with promising mineralization; and educational brochures explaining Alaska's geology or natural-science features. Some of DGGs's recent publications include: ♦ Quaternary faults and folds of Alaska online interactive map ♦ Report on Pacific northwest earthquakes and potential effects on Alaska ♦ Yukon River bridge landslide: Preliminary geologic and geotechnical evaluation ♦ Tsunami inundation maps of Port Valdez and Sitka ♦ Preliminary evaluation of coastal geomorphology and geohazards on 'Kigiqtam Iglua', an island northeast of Shishmaref ♦ Surficial-geologic and engineering-geologic maps of the Alaska Highway corridor, Tetlin Junction to Canada border ♦ Coastal hazard field investigations in response to the November 2011 Bering Sea storm ♦ Fossil fuel and geothermal energy sources for local use in Alaska: Summary of available information.



Publications are available in paper format (plotted as needed and sold for printing cost) and as digital PDF documents and scanned, compressed maps on the DGGs website (available for download at no charge). An increasing number of GIS digital datasets are available on the DGGs website, along with the maps and accompanying figures. Having the geospatial data available allows our users to download the data and use it as they need. The geological and geophysical data and reports published by DGGs encourage wise management and exploration of Alaska's natural resources and mitigation of risks from the state's geologic hazards.

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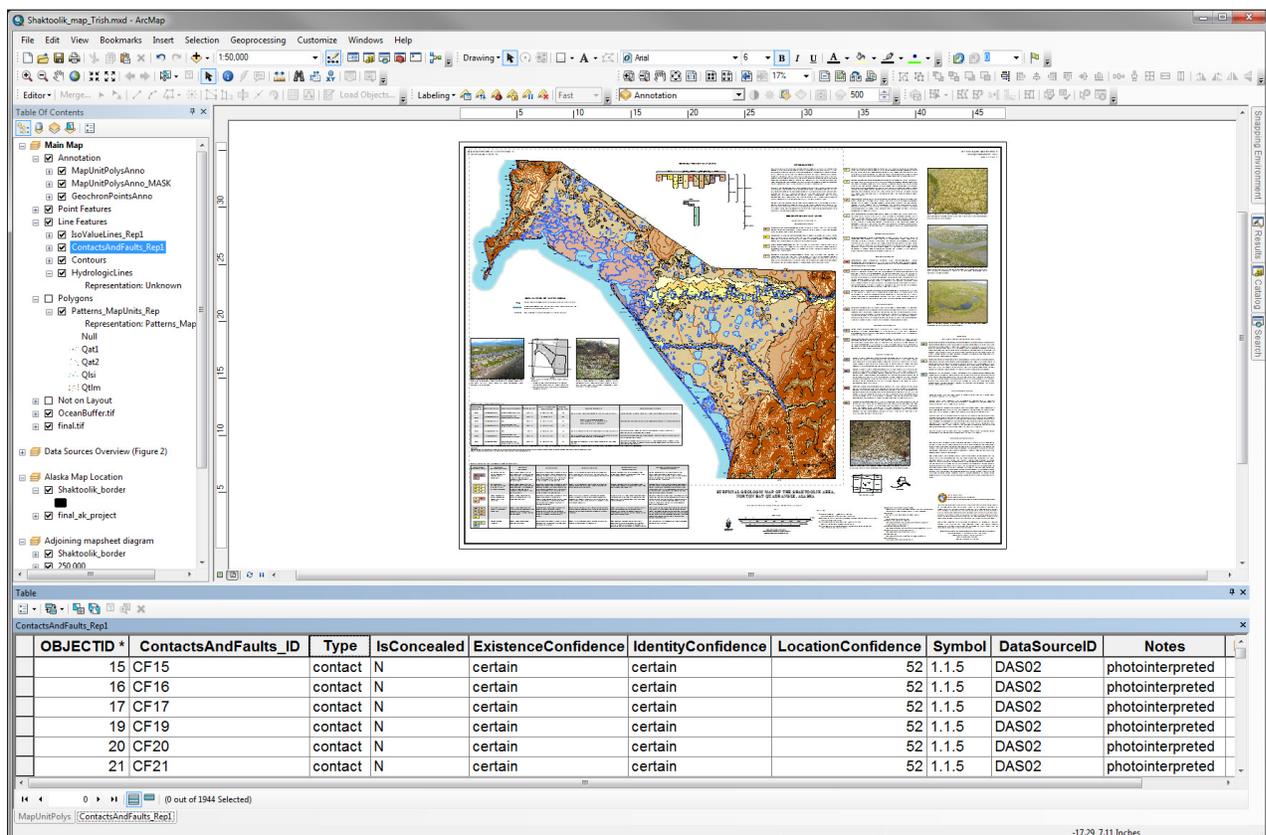
## GEOGRAPHIC INFORMATION SYSTEM (GIS) PROJECTS

The GIS projects underway at the Division of Geological & Geophysical Surveys (DGGS) are designed to take advantage of recent advancements in geospatial tools, to present DGGS's geospatial data in multiple ways, and to provide the State with a comprehensive repository of all geoscientific data that we collect and distribute. While we continue to provide conventional maps and reports (available in both paper and PDF formats), we are rapidly expanding our GIS products to include more tabular files of analytical data, map data in shapefile format, geospatially-referenced image collections, web map services, and online map- and text-based search interfaces. This array of GIS products makes our information readily accessible to the widest possible audience, decreases the effort required to view, obtain, and use the data, and ensures systematic stewardship of legacy data.

In FY13 DGGS implemented a division-wide, standardized data design model and a higher degree of consistency in our meta-data. Significant changes in workflow have shifted much of the cartographic, data management, and metadata compilation tasks from scientists to GIS and data management specialists. This assembly line approach allows DGGS scientists to focus on data collection and interpretation, and then hand off their interpreted data to GIS and database support staff for final cartography, formatting, and metadata compilation. In turn, support staff are able to use their topical expertise to provide users with GIS data that is optimized for a wide range of software applications, organized to allow for easy integration with other sources of information, and consistently described to extend the life cycle and broaden the usefulness of the information.

An important component of our revised data production process is implementation of a standardized geodatabase model based on the U.S. Geological Survey (USGS) NCGMP format (<http://ncgmp.usgs.gov/>). Instituting this model as our geodatabase format standardizes the data's content, attributes, naming conventions, and other pertinent information required for archiving and disseminating geologic map data, and ensures that all datasets are consistent.

Developing and implementing division-wide data standards for our GIS products has required significant modifications to the steps we use to prepare our data for distribution. Individualized processes, which worked well when our products were largely limited to print files, simply could not be sustainably adapted to provide end products that could be utilized by GIS users and integrated with other datasets. Our commitment to providing standardized data has already enabled us to develop an efficient and rigorous process for validating data and generating metadata. In time, these improvements will provide a solid organizational foundation from which we can cost-effectively build future web map applications, provide cartographic support, and generate high-quality metadata.



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## GEOLOGIC MAP INDEX OF ALASKA

In FY2013 the Division of Geological & Geophysical Surveys (DGGS) continued efforts in support of the goal of providing data via interactive web interfaces to quickly deliver real-time, detailed information to the public. DGGS has released several web map search interfaces to allow access to a variety of data types, including the "Geologic Map Index of Alaska" (<http://maps.dggs.alaska.gov/mapindex/>) in October 2013. This application provides the locations and outlines of most DGGS and U.S. Geological Survey (USGS) geological and geophysical maps of Alaska in a single, interactive web map. It allows searches of the database by geographic area of interest, keywords, map themes (bedrock, engineering, and surficial geology, geophysics, hazards, resources, etc.), publishing agency, dates, and other criteria. Users can highlight search result records by individual publication or map selection and export them to an Adobe PDF document. The search results link to DGGS's comprehensive, multi-agency publications database, where users may view and download publications for free. No other geographic index of Alaska geologic map polygons exists at this time.

This valuable resource makes it easier for anyone with Internet access to find the geologic maps they need to perform research, make informed resource- and land-management decisions, and better understand the geology of the state. The Map Index provides access to approximately 4,300 traditional geologic maps, as well as geophysical, sample location, geologic hazards, and geologic resources maps. DGGS plans to add outlines and data to the application for remaining geologic maps published by DGGS, USGS, U.S. Bureau of Mines, and U.S. Bureau of Land Management. The USGS's National Geologic Map Database (<http://ngmdb.usgs.gov/>) is sharing its data with DGGS to streamline the process of updating the Map Index database and keep the USGS publication information current. Reports without maps can be accessed through DGGS's comprehensive publications database, [www.dggs.alaska.gov/pubs/advanced-search](http://www.dggs.alaska.gov/pubs/advanced-search).

The project was initiated with funding from the Federal Minerals Data and Information Rescue in Alaska (MDIRA) program, administered by USGS. Compilation and maintenance of the back-end database is now supported by State of Alaska General Funds.

The screenshot displays the "Geologic Map Index of Alaska" web application. At the top, a navigation menu includes links for Home, About Us, Publications, Sections, STATEMAP, Geophysics, Geologic Materials Center, Contact Us, and Links. Below the menu, the breadcrumb trail reads "Natural Resources > Geological & Geophysical Surveys > Interactive Maps > Geologic Map Index of Alaska". The main heading is "Geologic Map Index of Alaska" with "[ Help ] [ Status ]" links to the right. A search bar contains the keyword "Gold", with "Search" and "Fewer Options" buttons. To the right of the search bar is a "More Options" panel with the following settings: Agency: DGGS; Year(s): From: [ ] To: [ ]; Quadrangle(s): Enter one or more quadrangles; Scale: From: [ ] To: [ ];  Include statewide maps?; Themes:  Geology,  Geophysics,  Hazards,  Other,  Resources. A large "Search" button is at the bottom of this panel. The central map shows Alaska with a yellow search area in the western part of the state. A scale bar indicates 1000 km and 1000 mi. The bottom of the map area shows "Map data ©2013 Google, INEGI, MapLink - Terms of Use". Below the map is the "Search Results" section, which shows "Showing 500" and "Displaying 1 - 77 of 77". It includes navigation buttons for "Previous", "Next", and "Sort by: Best Match", along with "Export", "Clear Selected", and "Reset" buttons. The first search result is listed as "PR 107" with a checkbox, followed by the text: "Reger, R.D. and Bundtzen, T.K., 1990, Multiple glaciation and gold-placer formation, Valdez Creek Valley, western Clearwater Mountains, Alaska: Alaska Division of Geological & Geophysical Surveys Professional Report 107, 34 p., 1 sheet, scale 1:63,360." Below this result are links for "Show Keywords" and "Zoom To".

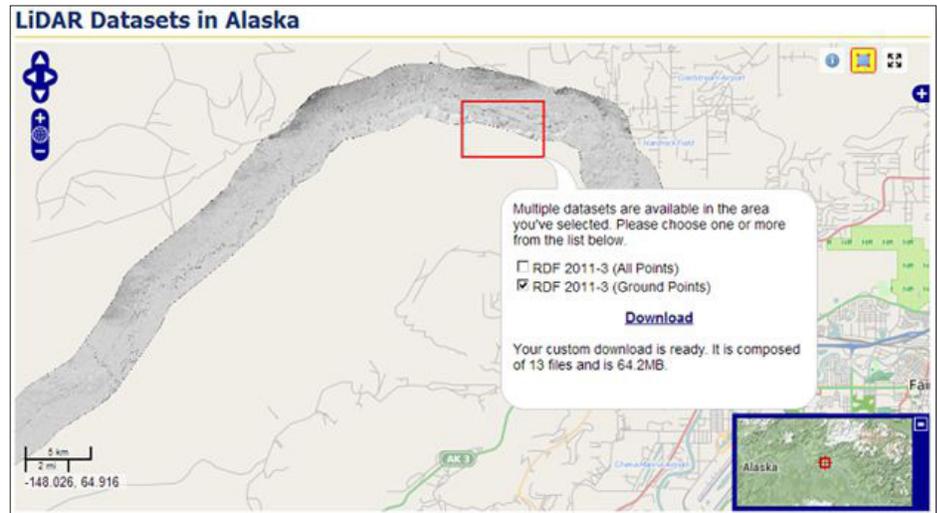
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### ONLINE MAP APPLICATIONS

#### LiDAR datasets in Alaska

In 2013 the Alaska Division of Geological & Geophysical Surveys (DGGs) identified a need to better disseminate to the public its collection of more than 4 terabytes of LiDAR data. As a result, DGGs created *LiDAR Datasets in Alaska*, (<http://maps.alaska.gov/lidar>) an interactive, web-based interface to DGGs's library of LiDAR data. *LiDAR Datasets in Alaska* offers instant access to one of the largest repositories of LiDAR data for Alaska, in total more than 3,050 square miles. The easy-to-use interface offers a preview of the available LiDAR data, broken down by survey, in the form of a digital elevation overlay. After viewing the available data, users can select an area as small as 750 square meters or as large as the entire state, putting the power in the hands of the user to precisely select their area of interest and download only what they need. Downloaded datasets are automatically packaged with metadata and publication references. Finally, all downloads are compressed—saving an additional 80 percent in bandwidth.

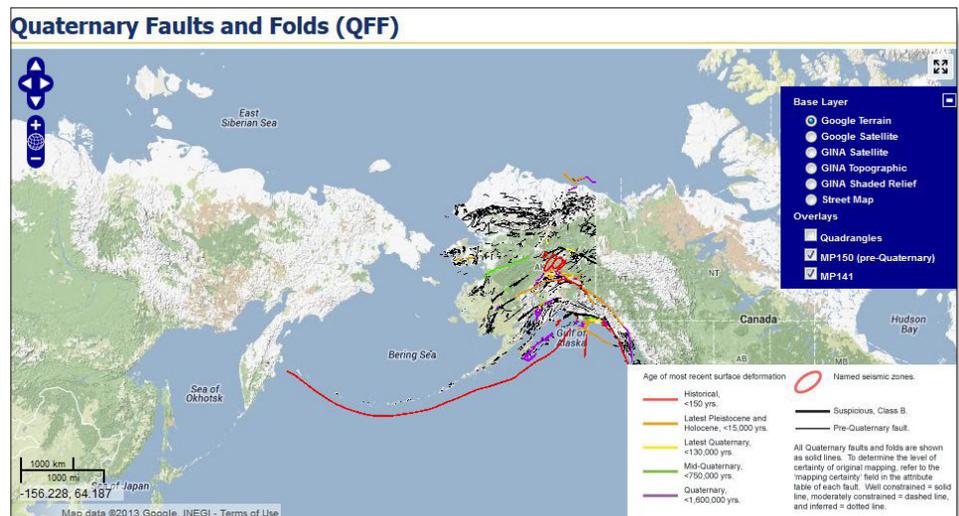


Screenshot from *LiDAR Datasets in Alaska*, showing a user selecting a small area in west Fairbanks for download.

#### Quaternary fault and fold database interactive web-based interface

In 2013 DGGs published Digital Data Series 3 (DDS 3; <http://maps.dggs.alaska.gov/qff>), an interactive, web-based interface that displays our Quaternary fault and fold database. The new web-based map displays the database information at the resolution of the original map and includes basic map options such as identification and search tools. Multiple base maps are displayed, including topography, satellite imagery, and digital elevation. Faults are color coded based on most recent age of activity including Historical (<150 yrs), post latest Wisconsin (<15,000 yrs), latest Quaternary (<130,000 yrs), mid-Quaternary (<750,000 yrs), and Quaternary (<1,800,000 yrs).

This web-based, interactive interface is designed to provide users easy access to both GIS shapefiles and fault parameters described in the database, including slip rate, age of most recent rupture, and dip direction, among others. Parameters are displayed on screen in pop-up windows accessed by clicking on individual faults. The GIS shapefiles are directly downloadable from the DDS 3 website (<http://www.dggs.alaska.gov/pubs/id/24956>).



Quaternary fault and fold database displayed on interactive map of the state of Alaska.

DGGs also digitized the legacy “Neotectonic map of Alaska.” This layer is available on the interactive map so that users may view the complete compilation of Neogene faults in Alaska. Many of these faults are relatively unstudied and future research will likely determine Quaternary activity on some structures. Pre-Quaternary faults and faults with suspected but undocumented Quaternary displacement are shown in black on the interactive map.

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## DISCOVERING ONLINE ALASKA GEOPHYSICAL DATA: AIRBORNE GEOPHYSWEB

To facilitate public discovery of published airborne geophysical data in Alaska, DGGS is developing the online Airborne GeophysWeb application. The application's user-friendly interactive map interface and text-search capability will facilitate searches for airborne geophysical datasets published by DGGS, U.S. Geological Survey, and Bureau of Land Management (BLM) since 1993. The application displays a representative image for each survey area and type of survey so users can get an idea of what the dataset might look like before they download. The Airborne Geophysical/Geological Mineral Inventory (AGGMI) program provides funding for the Airborne GeophysWeb application.

Details about the geophysical surveys, data collection parameters, and representative images displayed in the application will be available through GeophysWeb application and as a separate downloadable text file. The detailed information will help users understand the intricacies of the datasets and process the data appropriately for their purposes. A "Get data" page for each survey area provides links to download the geophysical data for free from DGGS's online publications database, and shows additional information of interest such as links to related geologic publications and adjacent geophysical surveys. The application will be kept current as older datasets are published or revised, and newly acquired data are published. The survey outlines and detailed information will be published as a downloadable GIS file in the future.

Airborne geophysical data are used to delineate regional geologic structures and identify rock types based on their geophysical signatures in conjunction with information collected from "boots on the ground" field work. Geophysical signatures are apparent even through surficial deposits and vegetation, which makes geophysical data an invaluable tool in the geologist's toolkit. Geophysical data are often used to help delineate mineral exploration targets and areas of interest and may also be used for energy exploration and locating permafrost.

Survey Name	Survey Type	Additional Survey Types	Year Flown	Nor (feet)
Southern Delta River	Get Data H-FDEM	H-Mag	1995, 2002	200
Southern Delta River	Get Data H-Mag	H-FDEM	1995, 2002	200

DGGS anticipates the application will be released by summer 2014 through DGGS's interactive map splash page: <http://maps.dggs.alaska.gov>. Geophysical survey area outlines and supporting information will also be available as a Web Feature Service (WFS), a real-time, online data format supported by most Geographic Information Systems (GIS) software. DGGS believes this online tool will lead to better access and increased use of important airborne geophysical data critical to the understanding of the framework geology of Alaska and its resources

Data File Format	Download	File Size
g_contours	Download	94.3 M
isometric_contours	Download	128.7 M
is_contours_flight_path	Download	90.4 M
is-HPGL2_01-09	Download	133.6 M
is-HPGL2_10-19	Download	137.5 M
is-HPGL2_20-28	Download	136.0 M
GPR2010_1_inedata_mag_em-XYZ	Download	184.0 M
GPR2010_1_inedata_rad-XYZ	Download	50.8 M
GPR2010_1_inedata_mag-em-GDB	Download	269.7 M
GPR2010_1_inedata_rad-GDB	Download	102.1 M
GPR2010_1_grds-GRD	Download	173.0 M
GPR2010_1_grds-ERS	Download	172.8 M
GPR2010_1_kmz_files	Download	95.6 M
GPR2010_1_geotiffs	Download	51.4 M
GPR2010_1_maps-PDF_01-14	Download	105.1 M
GPR2010_1_maps-PDF_15-28	Download	97.1 M

**Publications**

**Geophysics**

- GPR 2010-1. Line, grid, and vector data, and maps for the airborne geophysical survey of the Moran Survey Area, Melozina and Tanana quadrangles, central Alaska. 2 inedata files, 19 grids, 20 GeoTIFFs and Google Earth KMZ files, 15 vector files, and 28 maps (56 sheets total) available on DVD for \$10. Individual sheets available for purchase.

**Related Geology**

- BDF 2011-4 v.2 Geochemical major-oxide, minor-oxide, trace-element and carbon data from rocks collected in 2011 in the Moran area, Tanana and Melozina quadrangles, Alaska

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## WEBSITE DEVELOPMENT AND DIGITAL GEOLOGIC DATABASE

Over the past decade, the Division of Geological & Geophysical Surveys (DGGS) website ([www.dggs.alaska.gov](http://www.dggs.alaska.gov)) has grown from a few static HTML pages to the division's primary mechanism for distributing geologic information, publications, and interactive maps. DGGS has become the leading Alaska geology-related database agency and a trusted online repository of geologic publications and data. The website allows users to search our publications catalog, an extensive collection of scanned reports, maps, and GIS datasets produced by DGGS and other geoscience agencies, including the U.S. Geological Survey, UAF Mineral Industry Research Lab, and U.S. Bureau of Mines. The volume of files and information provided by the DGGS website has grown exponentially. It also provides web users easy access to geophysical data, geochemical data, information about its Geologic Materials Center, an online Guide to Geologic Hazards in Alaska, the Alaska Geologic Data Index, descriptions of the division's projects and special studies, Alaska's mineral industry reports, and other topics of interest.

Website content is nearly completely dynamically generated by the division's Oracle database system. Development of this geologic database was initiated as part of the federally funded Minerals Data and Information Rescue in Alaska (MDIRA) program in 2000; ongoing data input, use, and maintenance of the database system are now an integral part of DGGS's operations and are supported by State general funds.

Since 2000, the database and website team has established a secure and stable enterprise database structure, loaded data into the database, and created multiple web user interfaces. During 2013 the team continued progress on various projects requiring database and web application support: Geologic Map Index of Alaska (p. 78), Airborne GeophysWeb (p. 80), Alaska Geologic Data Index, Geologic Materials Center Inventory (p. 82), Alaska Paleontology Database, and other web mapping applications in our Digital Data Series (p. 79). Also, we have ongoing additions of geochemistry data to Webgeochem, and Alaska-related U.S. Bureau of Mines and U.S. Geological Survey publications to the publications search, as well as maintenance of existing applications. In 2013 DGGS also made incremental improvements to the website, including optimizing site performance, the addition of the Alaska Tidal Datum Portal, standardizing our digital data releases, and publishing web services for our GIS users.

In the coming year DGGS will continue to expand its repository of geologic data and strive to incorporate new technologies that meet public demand for advanced, easy-to-use, online data delivery systems.

